COMSAT CORPORATION

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6560 Rock Spring Drive
Bethesda, MD 20817
Telephone 301 214 3000
Fax 301 214 7100
Telex 197800

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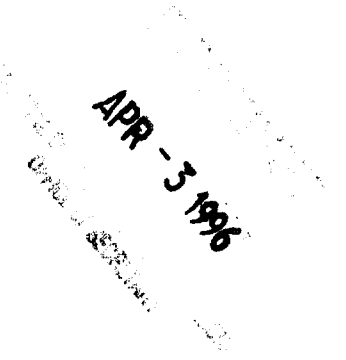
April 3, 1996



BY HAND

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Room 222
Washington, D.C. 20554

Re: Ex Parte Contact in ET Docket No. 95-18

Dear Mr. Caton:

On Wednesday, April 3, 1996, representatives of COMSAT Corporation ("COMSAT"), ICO Global Communications ("ICO"), Hughes Electronics ("Hughes"), Celsat America Inc. ("Celsat"), and Personal Communications Satellite Corporation ("PCSAT") conducted a briefing for FCC staff in the Wireless Bureau. The parties representing COMSAT were John S. Hannon, Raymond Crowell, Jeffrey Binckes, Sam Nguyen, Phil Permut and the undersigned. Also present were: Cheryl Tritt on behalf of ICO; John Janka on behalf of Hughes; David Otten and Toni Cook Bush for Celsat; and Bruce Jacobs for PCSAT. The participating FCC staff are identified below. The primary purpose of the briefing was to discuss COMSAT's Supplemental Comments filed in the above referenced docket on March 14, 1996, which request that the FCC incorporate the actions taken at WRC-95 into its decision in this proceeding. A copy of the briefing materials presented to the Wireless Bureau is attached to the original and one copy of this letter filed with the Secretary.

Respectfully submitted,

Nancy J. Thompson
COMSAT International Communications
General Attorney

Attachments

cc: Rosalind Allen
Karen Brinkmann
David Wye
Jennifer Warren

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COMSAT'S PHASED TRANSITION PLAN FOR 2 GHz

APR - 3 1996

The key steps under COMSAT's phased transition plan to facilitate the introduction of 2 GHz MSS service in the United States by the year 2000 are as follows:

1. The Commission should immediately implement the Final Acts of WRC-95 regarding the spectrum allocations and dates of access for MSS so that the 1990-2025 MHz/2160-2200 MHz bands are allocated for MSS uplinks and downlinks, respectively, commencing January 1, 2000.

2. The results of WRC-95 and the information provided by COMSAT establish that terrestrial FS and MSS can share the band 2160-2200 MHz after January 1, 2000 in the U.S. as part of a long term transition plan. Thus, the FCC should implement MSS in the 2 GHz bands under a phased transition approach consistent with the results of WRC-95 by adopting COMSAT's alternative transition plan, as clarified herein.

3. To implement the transition, the Commission should impose a freeze on all new Broadcast Auxiliary Service (BAS) and FS licenses for the bands 1990-2025/2160-2200 MHz effective with the adoption of an Order in this proceeding.

4. In the MSS uplink, the BAS operators now occupying the 1990-2025 MHz band in the United States should be required to work with the MSS applicants to accommodate MSS operators in two phases:

    a) Under phase 1, the BAS operators would vacate the 1990-2008 MHz band (BAS channel 1) by the year 2000. This could be accomplished with minimal impact on BAS by rechannelization of the BAS band, as described in COMSAT's alternative plan.

    b) Under phase 2, the BAS operators would vacate the 2008-2025 MHz band (BAS channel 2) by the year 2005 through digitalization and/or relocation to other bands. However, after January 1, 2000, BAS operations in this band would become secondary to MSS and would be required to accommodate any MSS systems proposing to operate in this band before the year 2005. After January 1, 2005, BAS operations in this band would cease.

5. In the MSS downlink, the terrestrial FS operators now occupying on a priamary basis the 2160-2200 MHz band in the United States would be required to negotiate sharing arrangements with MSS applicants proposing to use this band, or specific segments of the band, between the years 2000 and 2005 consistent with the results of WRC-95. After January 1, 2005, all FS operations in this band would cease; existing FS operations would migrate to other bands during the transition period.

6. In the MSS downlink specific coordination arrangements to share all, or certain portions, of the band should be determined by the FS/MSS operators before the end of 1996. The Commission should validate industry agreed guidelines, as necessary, to implement MSS/FS sharing at 2 GHz.

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NTIA Special Publication 94-31

APR - 3 1996

U.S. NATIONAL SPECTRUM REQUIREMENTS: PROJECTIONS AND TRENDS

U.S. DEPARTMENT OF COMMERCE
Ronald H. Brown, Secretary

Larry Irving, Assistant Secretary
for Communications and Information, and
Administrator, National Telecommunications
and Information Administration

March 1995

DEVELOPMENT OF SPECTRUM REQUIREMENTS FOR THE FIXED SERVICES

SPECTRUM REQUIREMENTS FOR HF FIXED SERVICES

The HF bands have been very crowded, because HF has been the only technology that could provide very long range coverage with a minimum investment in infrastructure. In the past, HF circuits operated by government, industry, and private and common carriers provided the great majority of long range fixed circuits, including most of the transoceanic circuits. All HF services remain extremely crowded today, with strong competition between services for spectrum and a substantial backlog of demand to absorb any frequencies that become available.

However, the availability of alternative technologies may bring a decrease in HF crowding. Communication satellites and greatly improved optical fiber undersea cables have taken over the majority of overseas circuits. Inexpensive VSAT terminals[209] and improved wired telecommunications infrastructure in many foreign countries are also reducing the past heavy dependency on HF circuits. Although HF fixed use may decrease, it will remain very important for emergency use within the United States and for backup communications between the United States and foreign countries. ALE techniques have recently made HF communications more reliable and useful.

SPECTRUM REQUIREMENTS FOR VHF AND UHF FIXED SERVICES

Fixed services in the VHF and UHF bands (30-1000 MHz) are generally not expected to grow rapidly, though some bands may. In many of these bands, the fixed services share frequencies with the mobile services, though the fixed stations may usually have to meet additional restrictions. The number of fixed assignments in the 406-420 MHz Federal mobile radio band, for example, declined slightly between 1986 and 1992, though the number of mobile stations doubled. On the other hand, the number of MAS stations is growing in some newly-allocated bands near 900 MHz.[210]

SPECTRUM REQUIREMENTS FOR COMMON CARRIERS.

The common carriers were the first to begin switching from microwaves to optical fiber. Figure 2-4 shows seven years of license data from the four most-heavily used common carrier bands.[211] This figure reflects two distinct trends. First, the number of licenses used for general common carrier purposes shows a decrease from the highs of the late 1980's in the 4 GHz, 6 GHz, and 11 GHz bands, probably caused by the replacement of microwave with optical fiber, a trend that is expected to continue. The decrease is especially

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[209] *See infra* p. 87 for a discussion of very small aperture terminal (VSAT) technology.

[210] MATHESON & STEELE, *supra* note 11, at 22-31.

[211] *Id.* at 43, 55, 59, 69.

noticeable in the 4 GHz band, where the presence of numerous TVRO stations has discouraged the licensing of new fixed stations.

The second trend is a recent increase in the use of microwave links to connect new cellular base stations. This trend was first evident in the 2 GHz band, but recently it can be seen in the 6 GHz and 11 GHz bands. Although this is a strong trend now, we expect this trend to become less important in a few years. Fiber and wideband copper are becoming more available in the urban areas where many future additional cellular sites will be established. Simultaneously, the cellular network is changing to carry denser traffic between more closely space sites—conditions that tend to favor fiber. Even if the number of licenses continues to increase in the 6 GHz and 11 GHz bands, this does not necessarily imply increased crowding, since many of these new licenses will be using the newly-created narrowband channels.

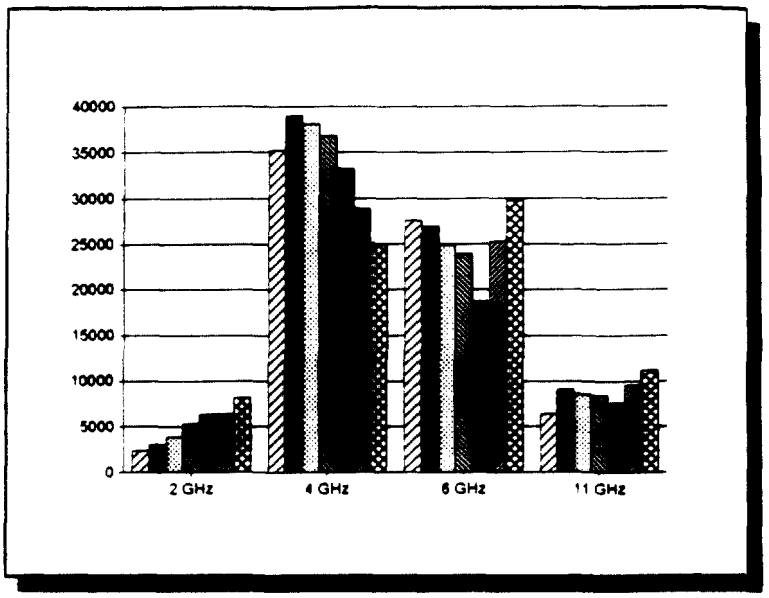

Figure 2-4. Number of licensed frequencies in the 2 GHz, 4 GHz, 6 GHz, and 11 GHz common carrier bands, 1987-1993.

Since the 2 GHz bands will be vacated for new PCS applications, it is expected that this growth will stop. Harris suggested that it may be a long time before PCS needs the 2 GHz bands in rural areas[212] and that major portions of the 2 GHz bands should be left to point-to-point microwave in the rural areas. [redacted] suggested that it would be very helpful to allow some of the displaced 2 GHz microwave systems to use some of the Federal 1710-1850 MHz band. One carrier stated that some of its microwave assignments "can, over time, be released to other services."[213]

Although the number of licenses in some common carrier bands is still growing, it is expected that the aggregate number of common carrier licenses in the 2 GHz, 4 GHz, 6 GHz, and 11 GHz bands will decrease over the next five years. Moreover, the remaining users (including the [redacted] cellular users) will carry comparatively less traffic, since the routes with the heaviest traffic will tend to be replaced with fiber first. The cellular telephone [redacted] will continue to add microwave links in support of new cellular networks and to relocate links from the 2 GHz bands, but will use an increasing percentage of fiber.

[212]Harris Comments at 2-10.

[213]Bell Atlantic Comments at 16-19.

The FCC has recently reallocated most common carrier and private microwave bands to make them equally accessible to common carrier and private use.[214] Previously, these bands were allocated for specialized use, with certain bands intended for wideband common carrier use and other bands intended for private use with an assortment of narrower bandwidths. The recent reallocation provides a complete assortment of bandwidths in most bands. This gives private carriers access to wideband channels and provides many more narrowband channels (suitable for cellular backbone) to the common carriers. Since all of these microwave bands are now allocated almost identically, the reallocation should also eventually erase the distinctive features that now make some bands crowded and others relatively empty. Therefore, in the future, growth of a particular service might not occur within frequency bands that have traditionally been associated with that service.

These trends are expected to continue over the next ten years, with the major uncertainty being whether support services for cellular telephone and PCS will use microwave or fiber. At the end of 10 years, it is expected that only 30 [illegible] percent of the present total number of assignments will be active in the common carrier service.

SPECTRUM REQUIREMENTS FOR PRIVATE OPERATIONAL SERVICES

The private operational services include a number of niche markets, including SCADA, remote operations, and short-range LEC bypass. These services are not particularly subject to competition from fiber, and private operational services have been growing steadily. Growth is slow (less than 5 percent) or negative for frequencies below 10 GHz (Figure 2-5)[215] and quite rapid (20 to 30 percent) for frequencies above 10 GHz (see Figure 2-3). Digital Microwave Corporation believes that the 18 GHz and 23 GHz bands will exhibit considerable growth, that higher capacity 16-QAM and 64-QAM modulation[216] may be needed, along with spectrum in the 26 GHz, 29 GHz, and 38 GHz bands.[217] On the other hand, Alcatel believes that attenuation due to rain and water vapor will curtail effective use of the microwave bands above 10 GHz when high reliability is needed.[218]

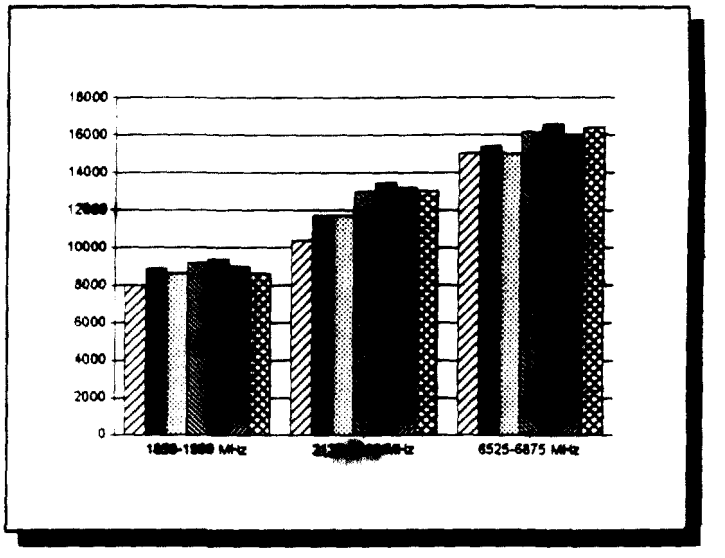

Figure 2-5. Number of licenses in selected private microwave bands, 1987-1993.

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[214] FCC 93-350, second report and order, adopted July 15, 1993.

[215] *Id.* at 39, 45, 61.

[216] *See infra* p. 204 for a discussion of quadrature amplitude modulation (QAM).

[217] Digital Microwave Comments at 3.

[218] Alcatel Comments at 1.

As several commenters noted, SCADA systems often require higher reliability than that obtainable with a single fiber route and require relatively low data rates—situations where fiber is not competitive. SCADA is often located in areas where fiber is not practical or economical to install[219]. UTC said that a much more complex regulatory and structural environment (open power distribution systems with multiple independent producers, automatic switching and load management, and tightened environmental controls) will double or triple the spectrum requirements for SCADA in the next five to ten years.[220]

The situation for LEC bypass is a little less clear. Although several commenters said that short-range bypass of the LEC was a probable growth area for higher frequency microwave,[221] it should also be noted that fiber is likely to be available less expensively in a competitive urban environment.

It is expected that there will be slow and steady growth in the private microwave services, amounting to a three percent growth rate, averaged over the next five years.[222] Over the next 10 years, it is difficult to predict the degree to which fiber will displace microwave LEC by-pass in urban areas and SCADA in rural areas. Much of the growth in these services will be in the 18 GHz and 23 GHz bands, with less growth in the bands designated as migration bands from the 2 GHz bands. No additional frequency allocations will be needed, because most bands (including empty bands above 23 GHz) still have adequate room for growth.

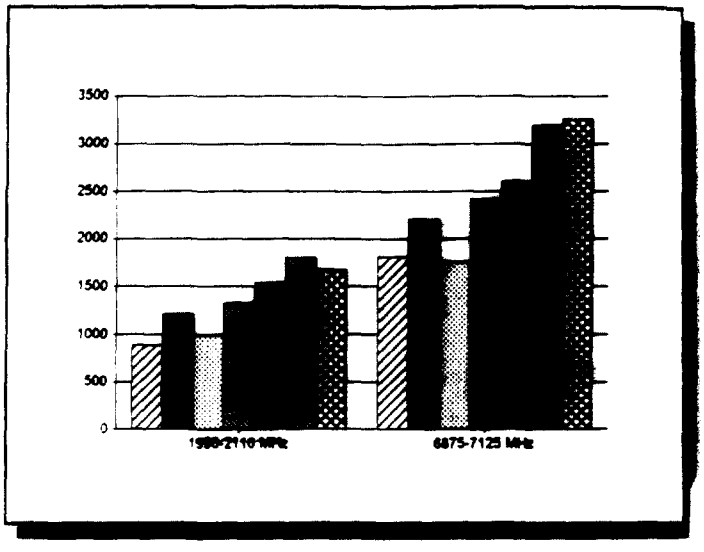

Figure 2-6. Number of licenses in selected AUXBC frequency bands, 1987-1993.

SPECTRUM REQUIREMENTS FOR AUXBC SERVICES

AUXBC is currently growing at a moderate rate (Figure 2-6),[223] but the industry is undergoing rapid changes, and it is not clear what will be the final outcome. The AUXBC bands are already crowded and will become more so, mostly because of the need to simultaneously transport NTSC[224] and HDTV signals and the increasing use of ENG

[219]AAR Comments at 8-10; Utilities Telecommunications Council *supra* note 199.

[220]UTC Comments at 9.

[221]AT&T Comments at 4; Digital Microwave Comments at 3; Alcatel Comments at 1.

[222]MATHESON & STEELE, *supra* note 11, at 123.

[223]*Id.* at 41, 63.

[224]The National Television Systems Committee (NTSC) signal format is the standard for television in the United States and numerous other countries.

for local news coverage.[225] To meet this crowding, digital signal compression will be used to squeeze in some additional ENG and STL links. In addition, many STL and ICR microwave links will be replaced with optical fiber. Nevertheless, broadcasters believe that crowding will be too great in the top 30 markets and intend to ask the FCC to reverse an earlier decision against providing more AUXBC spectrum.[226]

NAB believes that the deployment of digital audio broadcasting (DAB) will require additional audio STL's, causing serious crowding in major metropolitan areas, and perhaps requiring an additional 5-8 MHz of spectrum for audio STL's.[227]

SPECTRUM REQUIREMENTS FOR CABLE RELAY SERVICES

CARS is replacing many microwave links with fiber. Beginning in 1992, many cable systems began converting their coaxial cable trunks and feeders to fiber to obtain a larger number of channels with improved quality. Recently, more ambitious plans to provide a broad mix of two-way services have added to the need for networks of fiber or fiber and coaxial cable.[228] These rapidly-changing plans include various partnerships between LEC's, cable companies, electrical utilities, and providers of PCS and cellular to provide analog TV, digital TV, telephone, data, TV-on-demand, electrical power management, etc. Irrespective of who the providers of these services are, or exactly what technologies are finally used, it is clear that CARS will be affected by the rapid and significant changes that are likely in this service.

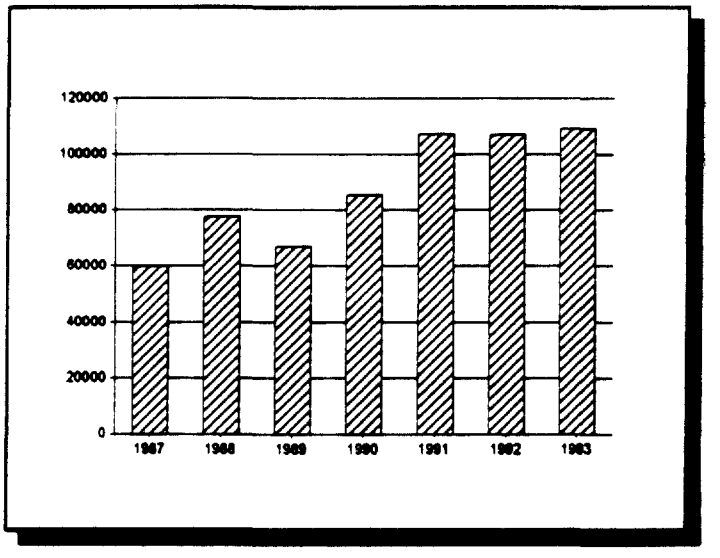

Figure 2-7. Number of licensed frequencies in the 13 GHz CARS band, 1987-1993.

The existing CARS microwave distribution architecture, based on one-way SHL's in the 13 GHz band, is not suited to the new two-way services which the cable companies would like to offer. Therefore, plans to provide two-way services on cable may require the switch to fiber. Figure 2-7[229] shows the number of licenses in the 13 GHz CARS band. This band was packed with more than 109,000 SHL assignments and was still growing rapidly in 1991. The growth stopped

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[225] NAB Comments at 4.

[226] MSTV Comments at 10.

[227] NPR Comments at 9.

[228] Craig J. Brunet, *Hybridizing the Local Loop*, IEEE SPECTRUM, June 1994, at 28-32.

[229] MATHESON & STEELE, *supra* note 11, at 73.

Figure 1

FCC's Proposed Re-allocation of 2 GHz Bands